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BACTERIOLOGICAL EXAMINATION OF SECRETIONS FROM CASES OF "SUMMER MASTITIS" AND EXPERIMENTAL INFECTION OF NON-LACTATING BOVINE UDDERS

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INTRODUCTION

The bacteriological examination of secretions from cases of acute mastitis of dry cows, "summer mastitis," made in the summer of 1948, showed that although *Corynebacterium pyogenes* was present in most cases it was seldom in pure culture. Examination under anaerobic conditions and the use of a selective medium (Edward's medium), which inhibits the growth of *C. pyogenes*, often revealed the presence of the following cocci: *Str. dysgalactiae*, an anaerobic coccus, and a microaerophilic coccus.

The following report gives the results of bacteriological examinations made on secretions from field cases of "summer mastitis" occurring in the north of England and Cheshire, in 1948-49 and 1950, and of attempts to infect dry cows and heifers experimentally.

BACTERIOLOGICAL EXAMINATION OF SECRETIONS

Eighty samples were examined by plating approximately 0·1 ml. of secretion on the surface of 5 per cent. sheep blood agar, and on crystal violet-aesculin-sheep blood agar (Edward's medium), and incubating these under aerobic and anaerobic conditions. The following results were obtained:—

C. pyogenes was isolated from 64 of the 80 samples examined, but in only four instances was it obtained in pure culture; in the remaining 60 cases it was associated with other organisms, nearly always one or more of three cocci, *viz.*: (i) an anaerobic coccus in 48 cases; (ii) *Str. dysgalactiae* in 34, and (iii) a microaerophilic coccus in 32 of the cases. *Str. dysgalactiae* was obtained in pure culture from five cases, and in four of the secretions the anaerobic and microaerophilic cocci were present together and were the only organisms isolated. Haemolytic staphylococci were isolated along with *Str. dysgalactiae* from three samples, *P. pyocaneus* with *C. pyogenes* in two, and a streptococcus of Lancefield's group C (*Str. zooendemicus* or "animal C") in one sample in which *C. pyogenes* and *Str. dysgalactiae* were also present.

When *C. pyogenes* was present in a sample it was almost always in numerical superiority and in some cases masked the presence of other organisms unless a selective medium (Edward's) was used. Anaerobic incubation in McIntosh and Fildes jars gave colonies of *C. pyogenes* and of *Str. dysgalactiae* which were larger than those obtained under aerobic conditions. This difference appeared to be due partly to the greater moisture content of the atmosphere in the jar, but a slight difference in favour of anaerobiosis was detectable with some strains when the aerobic atmosphere also was fully saturated.

DESCRIPTION OF THE ANAEROBIC AND MICROAEROPHILIC COCCI

1. ANAEROBIC COCCUS

Morphology.—This is a small Gram positive coccus occurring mainly in pairs or short chains and occasionally in tetrads and small clusters.

Growth Characteristics.—It is an obligate anaerobe, has a characteristic foul smell on all the media on which it was grown and produces no pigment. Colonies on blood agar are non-haemolytic, 1 to 2 mm. in diameter, circular, low convex, entire and greyish, and are easily emulsified, forming a homogeneous suspension in saline. In deep agar, there is no growth in the top 3 cm. of the medium, but below that level growth occurs as biconvex lens-shaped colonies, 2 mm. in diameter, whilst gas is produced, splitting the medium, in three days or longer. Hydrogen sulphide is produced. Growth in peptone water and nutrient broth produces uniform turbidity with little deposit. On inspissated serum slopes, small discrete colonies are formed with no liquefaction of the serum. Indole is produced in peptone water; ammonia is not formed. Methyl red and Voges-Proskauer tests are negative. No carbohydrates are fermented and litmus milk is not altered.

Pathogenicity.—Non-pathogenic for rabbits, guinea-pigs and mice.

Source.—The organism has been isolated from cases of "summer mastitis" in cows and, in addition, from four cases of traumatic reticulitis, four cases of foul of the foot, and two cases of metritis in cattle.

Identification.—The coccus resembles that described by K. Leth-Jorgensen (1938), except that the colonies of his organism were mucoid and stringy when lifted with the loop. Leth-Jorgensen believed that the organism was the same as that described by Christiansen (1934), who named it *Micrococcus indolicus*.

2. MICROAEROPHILIC COCCUS

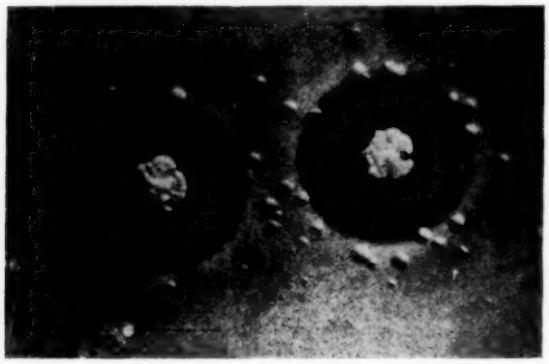
Morphology.—This is a small organism, usually coccal, occasionally oval, but never bacillary in shape, occurring in pairs, short chains and irregular clumps. Some large coccal forms sometimes are present. It is feebly Gram positive.

Growth Characteristics.—On the surface of blood agar or of Edward's medium and under aerobic conditions growth usually occurs only around colonies of *Str. dysgalactiae*, non-haemolytic staphylococci or some other organisms (see photograph). No growth factor could be demonstrated in filtrates of broth cultures of *Str. dysgalactiae* and staphylococci. After a number of subcultures, and occasionally on primary isolation, feeble growth of minute dew-drop colonies remote from "mother colonies" is obtained on blood agar under aerobic conditions and in atmospheres of pure oxygen. Under anaerobic conditions growth in pure culture is more profuse, but the colonies still are small. The addition of 10 per cent. carbon dioxide to the atmosphere tends to inhibit growth. The colonies

are convex, smooth, entire and translucent, and are easily emulsified in saline, giving a uniform suspension. Colonies on blood agar plates produce zones of haemolysis when left at room temperature for long periods. Serum is required for growth in liquid media and, even with this addition, growth is scanty and occurs in the form of a powdery sediment. Feeble growth with no evidence of liquefaction occurs on inspissated serum slopes. Indole and ammonia are not produced; Methyl red and Voges-Proskauer tests are negative. Acid is produced from lactose, galactose and salicin, usually from mannose and dextrin, and occasionally from trehalose, maltose and laevulose. No change is produced in litmus milk.

Pathogenicity.—Non-pathogenic for rabbits, guinea-pigs and mice.

C. pyogenes is usually present in the secretions along with this organism and may also be present in the halo around those of *Str. dysgalactiae* on Edward's medium. Care must be taken, therefore, in picking colonies because non-haemolytic colonies of *C. pyogenes* are indistinguishable from colonies on this coccus, although they are haemolytic on subculturing and liquefy inspissated serum.



Colonies of the Microaerophilic Coccus in satellite formation around Colonies of *Str. dysgalactiae* on Edward's Medium.

Experimental Infection of Non-lactating Bovine Udders

In an attempt to find the significance of the mixture of organisms generally found in summer mastitis secretions, the udders of pregnant non-lactating heifers and cows were infused with combinations of these organisms *via* the teat canal. Heifers were used because their udder secretions were almost always sterile, whereas cows were often infected with micrococci. Some quarters were infused with pure cultures and others with mixed cultures in an approximately equal dose (1 c.c. of bacterial suspension in saline of opacity equal to one-tenth of Tube I of the scale of Brown, 1919). The table at the head of the next column shows the combinations of organisms used and the number of quarters which developed acute mastitis up to four weeks after infusion.

Thirty-three out of 38 quarters infused with a mixture of *C. pyogenes*, *Str. dysgalactiae*, the anaerobic coccus and the microaerophilic coccus developed an acute mastitis, quite as severe as cases of summer mastitis met in the field. This was accompanied by intermittent fever with peaks of 106° F. to 107° F. and often stiffness of the hind limbs, sinus formation in the affected quarters and a foul-smelling purulent secretion. Four animals died and three aborted and there was acute inflammation of the udder

Experimental Infections

Cultures infused	Number of quarters	
	Infused	Positive
C. pyogenes, *Str. dysgalactiae*, anaerobic coccus and microaerophilic coccus	38	33
C. pyogenes	20	4
" and *Str. dysgalactiae*	11	6
" " anaerobic coccus	3	2
Anaerobic coccus	3	0
C. pyogenes, *Str. dysgalactiae* and microaerophilic coccus	2	2
Str. dysgalactiae	7	2
Microaerophilic coccus	3	0
C. pyogenes and microaerophilic coccus	1	0
Str. dysgalactiae, anaerobic coccus and microaerophilic coccus	1	0
Str. dysgalactiae and microaerophilic coccus ...	1	0

with pus in the teat cisterns and milk ducts. In the fatal cases, gas was present in the udders, the inflammatory reaction extended to the subcutaneous tissue around the udders and *C. pyogenes* was cultured from the heart blood of three of them. In quarters which failed to develop acute mastitis some pus was present in the teat cisterns on *post-mortem* examinations: *C. pyogenes* and the cocci were often present in these quarters up to four weeks after infusion. *C. pyogenes*, however, persisted in these quarters with greater regularity than the other organisms and was recovered from affected quarters for as long as 18 months after infection. All four organisms were usually recovered from affected quarters during the acute stage and for a few weeks afterwards. These quarters became fibrous and produced no milk when the animals calved.

Of 20 quarters which were injected with *C. pyogenes* in pure culture four developed an acute mastitis. The reaction was somewhat less severe than those described above and the foul smell often associated with summer mastitis secretions was absent. *C. pyogenes* was recovered from the secretions of quarters which did not become clinically affected during the four to six weeks after infusion and prior to calving. These quarters produced milk after calving and the organisms then rapidly disappeared.

In five heifers which were injected with *C. pyogenes* in one quarter and *Str. dysgalactiae* in the other quarter of the same side of the udder both organisms were present in seven of the ten infused quarters after one week. The results of infusion of these seven quarters are not included in the table; three developed acute mastitis. In five heifers which were infused with a mixture of all four organisms in two quarters of one side of the udder there was no spread of infection to the quarters which were not infused.

Str. dysgalactiae in pure culture caused acute inflammation in two out of seven quarters infused, whereas the anaerobic and the microaerophilic cocci each failed to produce clinical change in three quarters. A mixture of *C. pyogenes* and *Str. dysgalactiae* produced acute mastitis in six of eleven infused quarters. The remaining combinations were carried out in too small a number of quarters to be of much significance.

Vaccination of Heifers with Formalin-killed Cultures

Cultures of *C. pyogenes* and the three cocci were sown in meat-piece broth, the whole cultures including the pieces

of meat being homogenised after the broth was inoculated and incubated for 48 hours. Formalin (0·2 per cent.) was added and the flasks incubated for a further four days and then kept in the cold store for three days. They were then sterile. These killed cultures were mixed and 50 c.c. of the mixture injected subcutaneously into five heifers which were six to seven months pregnant. Swellings resulted at the sites of inoculation, but subsided in seven to ten days.

Three weeks after inoculation the five vaccinated heifers and five control heifers were each injected in two quarters with 1 c.c. of mixed cultures of the four organisms. In the vaccinated group, seven out of ten quarters became affected; eight out of ten were affected in the control group. There was no difference in the severity of the mastitis nor in the average temperature reactions of the two groups.

Vaccination of Heifers with Live Cultures

A saline suspension of the four organisms equal in opacity to Tube 3 of Brown's scale was inoculated subcutaneously into five pregnant heifers. Abscesses, in some cases larger than an orange, were produced in one to two weeks at the site of inoculation. These abscesses discharged slightly and gradually subsided until at three months only slight thickening of the skin remained and no organisms could be recovered. Frequent bacteriological examination showed the udder secretions to be sterile during the period between vaccination and infusion of the udders.

Five weeks after vaccination the five vaccinated heifers and five unvaccinated heifers were each infused in two quarters of the udder as in the previous experiment. Eight out of ten infused quarters in the unvaccinated heifers developed acute mastitis whereas only two of the ten infused quarters in the vaccinated group were affected up to five weeks after infusion. At this time another of the vaccinated heifers developed acute mastitis in the two infused quarters shortly before she calved. On the day following infusion the average of the temperatures of the control heifers was 2·5° F. higher than that of the vaccinated group.

Discussion

The regularity with which acute mastitis, indistinguishable from naturally occurring cases of "summer mastitis," was produced by infusion of non-lactating udders with a mixture of *C. pyogenes, Str. dysgalactiae,* the anaerobic coccus and the microaerophilic coccus, compared with the frequent failures of infusions of *C. pyogenes* in pure culture to set up an acute inflammation, suggests that these cocci are of significance in the causation of this condition. Further investigation, however, is required on the exact part played by each. The frequent negative results of attempts to produce the condition by infusion of pure cultures of *C. pyogenes* are in agreement with those of earlier workers quoted by Munch-Petersen (1938) and with attempts by Schalm (1944) which resulted in only a transient inflammation of the quarters, which soon became normal.

Almost all the samples received from the field for examination came from cows which had had at least one calf and the presence of *Str. dysgalactiae* may have been due to an infection contracted during a previous lactation and might be an indication of a low resistance to mastitis in the affected quarter. The other two cocci have not been found in mastitis of lactating cows, but this possibly may be explained by the fact that these cases are seldom examined by anaerobic cultural methods. It is unlikely that they were contaminants from the outside of the teats as faecal organisms were absent from the samples.

Christiansen (1934) and Leth-Jorgensen (1938) reported a few cases of acute mastitis of dry heifers and cows in which an anaerobic coccus, *Micrococcus indolicus,* was found. The anaerobic coccus reported here is similar to *Micrococcus indolicus,* but neither it nor the microaerophilic coccus has been reported previously in this country in "summer mastitis." As the microaerophilic coccus has certain fermentation reactions in common with *C. pyogenes,* and as satellitism has been reported in other corynebacteria by Svendsen *et al.* (1947) and Steen (1949), the possibility of it being a variant of *C. pyogenes* cannot be disregarded entirely. Nevertheless, strains of this organism have maintained their distinguishing characteristics for upwards of two years.

Although vaccination with living cultures apparently gave some protection against experimental "summer mastitis," and although there was no evidence of spread of infection to the udder or uterus from the subcutaneous abscesses produced at the sites of inoculation, it would be unsafe to use this possible method of protection in the field. One heifer was kept for a year after subcutaneous inoculation of living cultures and was slaughtered eventually on account of a traumatic reticulitis. *C. pyogenes, Str. dysgalactiae* and the anaerobic coccus were cultured from the pus around the foreign body in the reticulum and abdominal wall. The abscess at the site of inoculation had resolved completely nine or ten months before slaughter.

Summary

The results of bacteriological examination of 80 secretions from naturally occurring cases of "summer mastitis" in cattle showed that *C. pyogenes* was usually present in association with one or more of the following organisms: *Str. dysgalactiae,* an anaerobic coccus (probably *Micrococcus indolicus*), and a microaerophilic coccus. A description of the anaerobic coccus and the microaerophilic coccus is given.

Thirty-three of 38 infusions made in non-lactating udders with a mixture of these organisms resulted in acute mastitis indistinguishable from field cases of "summer mastitis"; only four of 20 quarters infused with pure cultures of *C. pyogenes* developed mastitis and it was of a less severe nature.

Vaccination of heifers with formalin-killed cultures gave no protection against experimental infection; vaccination with living cultures gave a partial protection.

Acknowledgments.—We wish to express our thanks to Dr. A. W. Stableforth for his interest and helpful advice in this work.

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Weekly Wisdom

The true English character is robust, independent and adventuring.—Sir George Stapledon.

THE WEST AFRICAN SHORTHORN CATTLE

Their Value to Africa as Trypanosomiasis-resistant Animals

BY

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After three years' retiral from the Colonial Veterinary Service, I have had leisure to study my information about these remarkable cattle. From 1929 to 1948, I had facilities for experiment at Pong-Tamale station in the Gold Coast and in the field.

It is essential that the term West African Shorthorn be understood properly. I use this term for all the unhumped cattle which live in West Africa south of the 12th parallel of latitude until Nigeria is reached, when that line dips south, having first done so in my 1929–30 annual report: "The indigenous, unhumped cattle, which in future I shall refer to as the West African Shorthorn cattle, owing to their similarity to the old Celtic Shorthorn of Roman days, possess a very high resistance to the disease (trypanosomiasis)." Some have referred to them as "taurine cattle," others as "pagan cattle," and so on. I do not use the term in any generic sense but from a broadly descriptive viewpoint. This has misled casual observers into regarding the West African Shorthorn as a homogeneous breed, local to the Gold Coast, whereas genetically it is extremely heterogeneous, that being accentuated by lack of any planned breeding on the part of the owners. The constitution of the cattle is largely a matter of chance. These cattle are a mixture of the three basic African breeds, the Hamitic Longhorn, the Brachyceros dwarf cattle and the Zebu. The features which are common to these cattle are the absence of a hump, short horns, small size and the ability to withstand a varying degree of trypanosomiasis.

They are rather small for beef, for work and for milk, and their uneconomic features have blinded people to their basic value as the one existing cattle beast which is resistant to trypanosomiasis and exists in areas where no other cattle can survive. A vast area of West Africa depends on these small cattle and although they may be deficient as a market animal compared to the Zebu, the development of "mixed farming" would be impossible without them: the West African Shorthorn cattle provide the peasant with his draught oxen, his manure and a little milk. Their potential value is great. Experiments carried out at Pong-Tamale under my direction were limited to a type of cattle beast which could at least stand up to optimum native conditions, as it was of no use to produce an animal which was too improved to thrive in the primitive environment of the Northern Territories of the Gold Coast.

The natural types of West African Shorthorn vary with the intensity of the local tsetse infestation. The less the infestation the more Zebu in the make-up and in the northern parts of the West African Shorthorn area the type of animal is known as the Sanga, which has been classified by Epstein as an ox: it has around 50 per cent. and over of Zebu in its make-up but remains unhumped. The greater the tsetse infestation the more Brachyceros or Hamitic Longhorn is the make-up and those animals which have a high proportion of *Bos brachyceros* are known as the Dwarf Shorthorn. The cattle of this type are small and stunted, about 3 cwt. in weight. It is interesting that in this southern area, bordering the Gulf of Guinea, and particularly in the eastern part, numerous dwarf animals exist. There are dwarf cattle, dwarf sheep and goats and dwarf poultry among domestic animals. Among wild animals are dwarf buffalo, elephant, hippo, crocodiles, antelope, etc., and there is pigmy man, too. Whether this dwarfism is genetical or due to some general nutritional disturbance is unknown, but the fact that large and small types of animals co-exist suggests that the nutritional factor is not wholly responsible. In the western half of the West African Shorthorn area, the type of cattle beast is an animal which has a large proportion of Hamitic Longhorn and this is the dominant type from Liberia westwards. These cattle, which can be seen in the Gambia, are reasonably sized, are not dwarfed, have larger horns than the average (tending to be lyre-shaped like the original Hamitic Longhorn ancestor, *Bos primigenius* Hahni) and have a high resistance to trypanosomiasis. To the east of Liberia, the Brachyceros strain predominates and the cattle are dwarfed. It would certainly seem that in cattle the dwarf animals are confined to those which are descended largely from the old *Bos brachyceros*. The types of West African Shorthorn cattle vary from south to north, the smaller in the south, the larger in the north. The African cattle owner admires the Zebu because of its larger size, weight and greater milk production and spares no effort to substitute it for the West African Shorthorn wherever possible. Had it not been for the presence of tsetse fly and trypanosomiasis, the West African Shorthorn cattle of the smaller and dwarf types would have become extinct in many areas and in others have remained as the Sanga type only. This has occurred in southern Africa, where the indigenous cattle are all of the Sanga type.

Several authorities have questioned the resistance of the West African Shorthorn cattle to trypanosomiasis. Professor T. H. Davey, in his "Trypanosomiasis in West Africa," stated that at best these cattle had a tolerance, while Professor W. T. C. Miller, in his "Report on the animal health and husbandry in the Gold Coast," said "the strongest word which I consider should be used is 'tolerance' and this should be employed in relation to the local environmental conditions obtaining at any given time and place. It is well known that capacity to survive infection with a particular strain or mixture of strains of local trypanosomes gives no guarantee that an animal can resist infection with differing strains even so short a distance as 50 or 60 miles away." I have come across sporadic cases of West African Shorthorn cattle contracting trypanosomiasis with fatal consequences, sometimes rather surprisingly, in accordance with Professor Miller's dictum, but the bulk of the evidence is such that I have no doubt of the practical resistance possessed by these cattle against trypanosomiasis generally and not merely against their own local strains. Resistance varies with the type of West African Shorthorn, the Sanga type with its high Zebu make-up being less resistant than the types with little Zebu in them. The fact that the West African Shorthorn lives, breeds and thrives in the area in question is indisputable. Zebu and other exotic cattle succumb to trypanosomiasis under natural conditions. Such generalisations are not scientific evidence so I summarise some of the evidence at my disposal.

PONG-TAMALE STATION EXPERIENCES

Twenty West African Shorthorn bullocks were inoculated with trypanosomes, ten with *T. vivax* and ten with *T. congolense*. The bullocks were native animals, mainly of the Sanga type. All became infected, with the exception of three *T. congolense* bullocks. No clinical signs appeared nor was there any loss of weight, but conditions were favourable, as food was abundant, grazing being at its best, while the cattle were in loose-boxes for a month after infection and were in good condition at the start. Blood slides were taken daily for three

months, by which time it was hard to detect trypanosomes, which had been scanty but easy to detect for the first month. For a year, these cattle showed trypanosomes in the blood occasionally, but usually they were negative. They were then treated with tartar emetic and entered the serum-producing herd at Pong-Tamale laboratory; during their year as serum-producing bullocks, one *T. congolense* bullock and two *T. vivax* bullocks showed trypanosomes in the blood, without clinical symptoms, and were re-treated.

In seven years at Pong-Tamale laboratory, out of a total of 1,573 bullocks used in the production of anti-rinderpest serum, 231 newly purchased bullocks showed trypanosomes in the blood; of these, 37 showed clinical signs, which were limited to loss of condition. During the same period, 160 bullocks in the serum herd showed trypanosomes in the blood and of these, 16 showed slight clinical signs. These cattle were treated by various drugs and a proportion relapsed and were re-treated. Bleeding cattle weekly for serum production is a strain on the system and tends to bring out latent trypanosomiasis. If bullocks were laid off bleeding and not treated, they soon picked up and regained condition, but on being bled, they broke down again. If such bullocks continued to be bled and not treated, they lost condition and became emaciated. Such animals would have died, but to prevent this they were "rested." A few did die when treatment was delayed. These figures establish a remarkable resistance but also demonstrate that this is resistance and not immunity.

From time to time, Pong-Tamale station was infested by tsetse fly until anti-tsetse eradication removed this danger. In four outbreaks of trypanosomiasis, out of a grand total of 1,113 cattle, 171 became infected, of which 62 showed clinical signs and eleven died. Forty-five of the clinical cases, which were mainly mild, were Sanga cattle. Of the eleven deaths, five were dwarf Shorthorns, two were Zebu cows and four were Sanga types. In the first outbreak, treatment was delayed; the infection was intense as there was heavy percolation of fly from the uncleared river: 91 cattle out of 188 became infected, 39 had clinical signs and nine died. The cattle had just been moved to Pong-Tamale from Tamale and many had never been exposed to trypanosomiasis infection.

RAIN FOREST EXPERIMENTS.—Zebu cattle do not survive in the rain forest and such cattle are slaughtered early, before they can succumb. Where there are clearings in the forest, grass is abundant and there is always ample water. At Sunyani and Obuasi, herds of West African Shorthorn cattle brought from N.W. Ashanti and the Northern Territories respectively were maintained in excellent health for years, throve well, bred normally and were always in good condition. Both herds were exposed to constant tsetse infestation but trypanosomiasis never appeared in clinical form, although parasites sometimes were found in the blood of a small proportion of the cattle, which remained in good health. At Kumasi Agricultural station, Northern Territories bullocks were worked regularly and retained good health. The Veterinary Department's livestock farm was at Kumasi in the early 1920s and the cattle did well; trypanosomiasis was not a problem though tsetse were abundant. No cases of unsuccessful West African Shorthorn trials in the forest came to my notice. Trouble with trypanosomiasis, however, manifested itself in two places on the edge of the forest, Ejura in Ashanti and near Nsawam in the south, where the Agricultural Department wished to use working bullocks. Several attempts were unsuccessful but on the edge of the rain forest there is often a concentration of tsetse of several species, *G. palpalis*, *G. submorsitans* and *G. longipalpis*, and the intensity of the infection is high, which was the explanation of these failures. Those places were just outside the actual rain forest and in thick savanna forest.

DISTANCE MOVEMENT EXPERIMENTS.—In 1938, under a re-stocking scheme, one bull and 13 cows were sent to each of two places in Gonja from Dagomba. The home of the cattle was almost tsetse free, but Gonja was heavily infested with *G. palpalis* and *G. submorsitans*. At Murugu, the 14 cattle did well and throve from the start. In the first year, two cows were treated when trypanosomes were found in the blood but no clinical signs supervened. At Bugei, the cattle did not do so well, the bull and six cows dying, allegedly from trypanosomiasis—they certainly were infected as blood slides proved, but contributory factors were the poor attention and lack of interest shown by the Bugei people and perhaps inefficient tartar emetic treatment by a junior African assistant. After a senior assistant arrived, no more deaths occurred. This was a very severe test indeed.

In 1938, a Native Administration cattle farm was formed at Krachi to encourage cattle breeding in that district. A herd was secured in Dagomba and walked the 170 miles to the new farm, which was infested by *G. palpalis* from the adjacent River Volta. One N'Dama bull and 24 local Dagomba cows comprised the herd. In the first rainy season, 15 cows became infected; seven of them with slight clinical signs were treated and recovered. Next year, two of the original cows were infected and one N'Dama heifer of six was sent from Pong-Tamale to augment the herd. None showed clinical signs and none was treated. Treatment following the appearance of trypanosomiasis seems to augment natural resistance and induces premunition. In natural infections in West African Shorthorn cattle, spontaneous recovery is the rule but loss of condition, if it occurs, usually continues until the appearance of the young grass in the early rains; there is more readiness to relapse and instead of premunition, chronic trypanosomiasis may supervene.

A severe test was when the Department of Agriculture of Nigeria purchased some 30 West African Shorthorn cattle of the Sanga type in the north of the Gold Coast and walked them several hundred miles through Togoland and Dahomey to Ilorin in Nigeria. These cattle were exposed to trypanosome infection throughout the journey and stood up to it well. At Ilorin, cattle were not treated but their natural resistance had to combat the infection—a very severe test indeed, which was usually successful.

INOCULATION EXPERIMENTS.—In 1939, I was sent a strain of *T. congolense* in guinea-pigs from the Tanganyika Veterinary Department, which was considering the importation of West African Shorthorn cattle into that territory. The Tanganyika Department was under the impression that the N'Dama variety was the only resistant type generally and that other types were resistant only to their own local strains of trypanosome. I inoculated two N'Dama heifers and two Dagomba bulls, a short type of West African Shorthorn with little Zebu in them. Trypanosomes appeared in number in the blood of all four cattle and remained in their blood for four months, thereafter becoming more and more scanty until it was very difficult to find them and then not each day. As it was clear that the animals would recover spontaneously, they were treated and sterilised of trypanosomes. The animals lost condition slightly in the first month; the weights of the young bulls remained static for five weeks, and that of one heifer for three weeks, while the other heifer put on a little weight each week. After these periods, however, the four cattle regained condition and put on weight normally. It was clear that the natural resistance to these exotic trypanosomes, stated to be a virulent Tanganyika strain of *T. congolense*, was sufficiently high to counter the infection, under good conditions of housing, food and environment. During the experiment, the animals remained isolated in loose-boxes at Pong-Tamale laboratory. The advent of the war inhibited

the passage of West African Shorthorn cattle to Tanganyika.

In 1930, the anti-rinderpest immunisation of the cattle of the Gold Coast commenced. While the West African Shorthorn is remarkably resistant to trypanosomiasis it is hypersusceptible to rinderpest. At the beginning of this campaign, this had not been realised fully and reactions were often very severe with high mortality. I had been warned by Nigerian experience that breakdowns to trypanosomiasis were common when reactions were over severe, with high mortality. In spite of many severe reactions, it was not until over 30,000 cattle had been immunised that the first breakdowns to trypanosomiasis appeared, in three young cattle of the Sanga type reacting mildly to the rinderpest treatment. They became seriously ill, revealed massive infections of *T. theileri* and died showing trypanosomiasis lesions. In my experience of anti-rinderpest immunisation, which covered over 700,000 West African Shorthorn cattle, breakdowns to trypanosomiasis were so infrequent that they were negligible. This is remarkable when the numerous latent infections are considered. At immunisation camps, where the young two-year-old cattle are brought annually to district centres, it was not unusual to find latent trypanosomiasis infection in some 10 per cent. of the cattle. In severe reactions, breakdowns and deaths from red-water were common. It is possible that latent trypanosomiasis may act as a catalytic agent. The susceptibility to rinderpest of the West African Shorthorn cattle is probably due to the fact that they had no contact with this disease until about 1896. The Zebu had long contact with rinderpest, and in the Gold Coast the West African Shorthorn cattle with around 50 per cent. Zebu in their genetical composition required approximately half the dose of anti-rinderpest serum required by the small dwarf shorthorn types, these animals being much lighter and smaller.

These experiments are a sample of many others and have been selected to show various types. The one unsuccessful experience, which came to my notice, was that of a Native Administration cattle farm at Han in the north-west of the Gold Coast. For four years it was successful. Then, owing to population decrease, *G. submorsitans* gained access and clinical cases of trypanosomiasis appeared. Most cases recovered under treatment but this *G. submorsitans* infestation kept producing cases with consequent calf mortality and other adverse phenomena. It was then decided to move the farm ten miles to a *G. submorsitans*-free area, where the herd did well. This is an example of the devastation caused by *G. submorsitans* where the fly cleans up an area in which man and his animals are declining due to soil exhaustion and other causes. When population falls to about ten per square mile, *vide* Dr. K. R. S. Morris, in comes *G. submorsitans* and delivers the *coup de grâce*. In this case, an attempt might have been made to continue the cattle farm and test the resistance of the cattle had it not been for the continuing depopulation of Han and the wishes of the Native Administration.

Breeding Experiments.—The defect of West African Shorthorn cattle is their small size, even the Sanga type being a small animal compared to the Zebu; their positive quality is their resistance to trypanosomiasis. Improvement of the breed brought interesting results. European bulls were susceptible to local enzootic diseases and their progeny too delicate. Improvement of the West African Shorthorn of the Brachyceros type by selection within itself proved unsatisfactory because of dwarfism, which appears genetical and is transmitted readily. All my experiments of this character were disappointing on account of this malign factor and experiments which I saw elsewhere were no better. However, the Zebu as a means of improvement proved successful and produced new types of improved West African Shorthorn cattle, which were economic and yet resistant to trypanosomiasis. By a combination of the N'Dama, a very trypanosomiasis-resistant type originating in French Guinea, the Zebu and the ordinary heterogeneous Gold Coast cow, I produced a type, which I called the N'Dama-Sanga, resistant enough for the more heavily infected areas and yet which weighed from 5½ to 6½ cwt., the usual West African Shorthorn animal weighing from 4 to 5 cwt. By combining the White Fulani Zebu and the local cow and then fixing the offspring I produced a heavier animal called the "White Sanga" and the cows in the herd at Pong-Tamale weighed from 6 to 7½ cwt. This type was suited to the more northern areas of the Gold Coast, where trypanosomiasis is sporadic. Their resistance is not so high as that of the N'Dama-Sanga. The N'Dama itself is a mixture of the three basic breeds of cattle, with the Hamitic Longhorn predominating, and is used by the French as an improvement animal *per se*, but I found the N'Dama too small and that it transmitted the dwarf factor, probably from its Brachyceros ancestor. Professor Miller, in his report already mentioned, remarked about these improved types of cattle that "Selective breeding of indigenous and exotic types of cattle has been carried on at Pong-Tamale since shortly after its establishment. There are herds of West African dwarf cattle, of N'Damas, Sangas and Zebus and various crosses between these, maintained with a minimum of artificial feeding, and kept under conditions as natural as possible, except that at night they are kraaled in well-built enclosures of laterite stone. . . . The herds which have now been selected for several generations are far more uniform in type, are larger, more robust, and give much heavier carcases than the usual type of cattle seen in the territory. I was unable to find any animals to approximate them in quality in the Gold Coast." It must be noted that even these improved cattle were disappointing milk yielders.

In studying the literature on the subject of natural resistance to trypanosomiasis, the writer has come across only one case of resistance comparable to the West African Shorthorn cattle. This was recorded by Dr. R. G. Archibald as occurring amongst the local cattle of the Koalib Hills of the Nuba Mountains Province in the Sudan. The photographs which accompany the article depict an animal identical with the Sanga type of West African Shorthorn found in the areas north of the tenth line of latitude.

The object of this article is to show that adequate *prima facie* evidence exists to postulate that in the West African Shorthorn cattle Africa possesses a valuable trypanosomiasis-resistant animal, which is at least frequently resistant to trypanosomiasis generally and not only to the local strains of trypanosome. It has also been shown that improved cattle of a useful economic type can be created by fusion with the Zebu, but at the same time the trypanosomiasis resistance can be maintained. The writer suggests that the West African Shorthorn cattle should be introduced to other African countries experimentally and tested to establish if the trypanosomiasis resistance is efficient in these *loci*. If successful, crossing with the local Zebu could be initiated to produce a bigger animal than the West African Shorthorn. Such experiments should be done on an adequate scale, using perhaps batches of 50 head and not merely half a dozen. Large sums of money have been voted by the Colonial Development Corporation to such schemes as the Gambia poultry venture on evidence which was very scanty and inadequate. In this paper, the writer has produced samples of more voluminous evidence, being careful to include any

malign phenomena. Throughout his work on this subject, which covered some 20 years, he has maintained a sceptical outlook on this breed resistance, but on perusal of information now, his opinion is that large-scale experiments with the West African Shorthorn cattle are justifiable in other parts of Africa, which have large areas of suitable cattle country and are now barren because of the lack of resistant cattle. The Zebu cattle have a slight tolerance to trypanosomiasis, although not sufficient to withstand West African conditions south of the 12th line of latitude, but this tolerance appears to be suitable for the creation of improved types of cattle, when crossed judiciously with the small West African Shorthorn and when hardy, suitable types of Zebu are used. The type of West African Shorthorn which is indigenous to the westward of Liberia and to the Gambia, is probably suitable for such an experiment and the N'Dama of French Guinea is particularly suitable as it is very resistant and also a fixed phenotypic animal, but other types, too, should be tried. It seems that the creation of trypanosomiasis-resistant cattle is a more practical and natural procedure than mass inoculations of cattle with drugs such as antrycide and attempts to maintain these doped cattle in tsetse areas. In acclimatising resistant cattle in new areas, it is my opinion that all cases of trypanosomiasis, whether clinical or not, should be treated and that this assists the achievement of premunition.

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EXPORT OF IRISH HORSES CONDEMNED

A resolution urging Wicklow Co. Council to make representations against the export of Irish horses to the Continent, and asking that a trade in horseflesh be substituted and the various by-products be kept in the country, was passed at the annual meeting of the Co. Wicklow Society for the Prevention of Cruelty to Animals, held in the Town Hall, Bray.

Mr. G. D. Crowe, of the International League for the Protection of Horses, said that last year 22,488 horses were exported to the Continent, as compared with 6,469 for the previous year.—*Irish Independent.*

CLINICAL COMMUNICATION

CAESAREAN SECTION IN THE EWE IN CASES OF SO-CALLED "RINGWOMB" OR PARTIAL DILATATION OF THE *OS UTERI*

J. B. HARMAR, M.R.C.V.S., AND E. D. MOUNT, M.R.C.V.S.,
BERWICK-UPON-TWEED

Each year in this practice we are confronted with several cases of what the shepherds here term "ringwomb." It occurs almost invariably in third or fourth crop ewes and in essentials it appears to be a failure of the *os uteri* to dilate.

The history of a typical case is as follows: The ewe commences to lamb, she strains forcibly and the amnion ruptures. After a few hours the shepherd examines her, and finds that although he can insert his hand into the vagina he can get only one or two fingers through the *os*. He then leaves the ewe and examines her later, to find the condition unchanged. Scarring due to a difficult lambing the previous year is generally blamed for the condition.

Previously the methods used to deal with this situation have been:—

(1) The application of belladonna ointment to the *os*.

(2) Bringing a lamb's leg or legs through the *os* with the fingers, and leaving the ewe, in the hope that the straining induced will dilate the *os*.

(3) As above, but applying forcible traction, with or without embryotomy.

(4) Gradual dilation with the fingers and hand.

(5) Incision of the *os*.

All these methods have proved most unsatisfactory, the death of the ewe being the common sequel.

We had previously performed caesarean section, using chloroform as the anaesthetic, but found the anaesthetic unsatisfactory. This year we have had success using Anavenol K.

Technique

Restrain the ewe on her back, pluck the wool from the abdomen, wash the abdomen, and sterilise with spirit or Cetavlon solution.

Several veins are available for the injection, but the mammary veins are the most suitable. There is much individual variation in size and disposition of the mammary veins in the pregnant ewe. In the majority of ewes there are two lateral veins, one for each half of the udder, and one central, running above the linea alba. In practice we take the largest of the three, and anaesthetise by slow intravenous injection, using a 50 c.c. hypodermic syringe with eccentric nozzle; between 40 and 60 c.c. Anavenol K are required. We take between four and five minutes to inject, frequently assessing the depth of anaesthesia—after the method designed by Professor Wright for nembutal anaesthesia. The injection is continued until the pedal reflex in the foreleg is lost. It has been found that this will give a minimum of 20 minutes' anaesthesia, which in the majority of cases is sufficient to complete the operation.

More spirit is applied to the abdomen, and a sterile cloth placed over it. The incision—about 6 inches long—is made slightly to one side of the midline, just in front of the udder, parallel with the linea alba. (In this position it appears less liable to interference by the lambs when sucking.) The uterus is examined, and the site for its incision is determined by relative freedom from large vessels. This

is usually in the left horn. The lamb in this horn is manipulated so that the hind legs will be as near as possible under the cut. The uterus is grasped with two pairs of bowel forceps, one at each end of the proposed incision, the horn is then partly withdrawn from the abdomen (by traction on the lamb rather than on the forceps). Should the uterine contents be septic, a small incision is made, the ewe tilted and any fluid allowed to escape clear of the abdominal wound. The incision is then enlarged and the first lamb removed. If the lamb is decomposed, this is best done by an assistant; a search is made for any other lambs (all our cases have been twins or triplets). The lambs are withdrawn by the hind legs. No attempt is made to remove the afterbirth. If the uterine contents are septic, sulphanilamide powder, or Compron pessaries are inserted. The uterus is closed with a continuous involuted suture and a tube of intramammary penicillin squeezed over it.

The abdominal wound is closed by means of several interrupted nylon sutures each anchored by a 1-inch piece of pressure tubing. These sutures run from the skin on the operator's side, through both muscular edges of the wound, and back again through the muscle to be anchored to the opposite end of the tubing. In practice we fix all sutures with artery forceps, leaving the tying up to the end of the operation. Between five and seven such sutures are required. One continuous nylon suture is now inserted, first along the edges of the muscle and then back along the skin, in such a way that, on removal, cutting a knot at one end will enable the operator to withdraw the whole stitch. We have used this method of closing the wound in heifers as well as in ewes and have never had a case of prolapse of the viscera. In some of the cases we now inject 3 c.c. pituitrin, and in some cases 10 c.c. blackquarter serum. This serum is most necessary in flocks with a history of septicaemia after lambing.

Recovery from this anaesthetic appears to be descending, as frequently when we have been sewing up, the man at the head has noticed tongue and jaw movements, and yet there has been no sign of returning consciousness at the hinder end.

The ewe is removed to a clean lambing pen and her lambs, if living, are placed beside her. This is necessary because, should they be left away from her until she is completely conscious, she will not recognise them, whilst, even before she is able to stand, she will lick her lambs; this also appears to settle the ewe and make her more comfortable.

The only after treatment is to keep the ewe in a dry clean pen for the first few days. The afterbirth is generally passed within six hours of the operation. The stitches are removed in ten to 14 days.

Comments

This operation is by far the most satisfactory method we have found for dealing with "ringwomb," as, since using it, we have lost only two ewes and no lambs that were alive at the commencement of the operation. With other methods the outcome has been: if treatment is prolonged, dead lambs, and most probably a dead ewe, and if violent methods are adopted, possibly live lambs, and certainly a dead ewe.

We have also used the same technique for delivering malpresented lambs when previous attempts by the shepherd have so bruised the vagina that manipulation or embryotomy is difficult or dangerous.

Case Reports

Details of four typical cases are given below.

(1) Aged half-bred ewe. Noticed lambing, 6 a.m. Examined by farmer—he was inexperienced with sheep and said he could feel nothing. He re-examined her again at 5 p.m. in company with a more experienced shepherd. They could insert one finger through the *os*. The amnion had ruptured at some time between the examinations. Two live lambs were removed by operation about 7.30 p.m. The lambs were taken into the house and given to the ewe the next morning. She resented them forcibly and fractured one lamb's leg. This was splinted. She had to be tied up for four days to allow the lambs to suckle, but after this accepted them. This ewe was inside the farm until the stitches were removed 14 days later, and there was first intention healing with no stitch sepsis. The lamb's leg healed.

(2) Half-bred ewe, third crop. Had been lambing some 18 hours. The shepherd had managed to tie string to each foreleg of the presented lamb, and had attempted traction. The vagina was swollen, and, with the forelegs repelled, only three fingers could be inserted through the *os*. The lambs were dead and the uterine contents septic. The ewe appeared very sick. Two dead lambs were removed. Two Compron pessaries inserted. 10 c.c. blackquarter serum given. The next day the ewe looked ill; there was evidence of a barbiturate "hangover" and 5 c.c. of "Distaquaine" was administered. She commenced eating 48 hours after the operation. When the stitches were removed she had improved in bodily condition; no evidence of discharge *per vaginam*. She was, however, shedding her wool.

(3) Very similar to Case 2. She was operated upon during a rainstorm in the open at night. Two dead lambs removed. She disappeared from the lambing shed 24 hours later in a bad storm and spent the night out. As she had not taken any harm from the outing, she was left out, and apart from some stitch sepsis made an uneventful recovery.

(4) Half-bred X Suffolk ewe. Fourth crop. Commenced lambing some ten hours previously. *Os* dilated to size of half a crown. Lamb posterior presentation: dead. Shepherd had examined twice but had not interfered. Two live lambs and one dead one were removed by operation. The ewe recovered well and one hour after the operation was suckling the lambs which she reared.

In all, eleven ewes were treated by this method. Two died, from pre-existing septicaemia and metro-peritonitis, shortly after the operation. Eleven live lambs were obtained which were all living and being nursed by their mothers 14 days after operation.

It may be argued that this is not an economic operation to perform on ewes, but it must be remembered that the value of sheep is constantly increasing. A successful outcome will considerably increase the prestige of the operator over the seller of medicines and sera in the eyes of the farmer and his shepherd.

MEAT

The world produced more meat in 1950 than ever before in history, the United States Agriculture Department said recently. Output of the principal livestock countries, exclusive of the Far East, is estimated at 72,500,000,000 lb., 5 per cent. over the 1949 estimate. Despite this record production, strong demand kept prices high.

But

Stockton (Co. Durham) butchers have declined an invitation to participate in a shop window display competition which Stockton Chamber of Trade is organising because they say "present conditions of the trade and availability of meat do not permit them to dress their windows as they would like to do." (Adjacent paragraph in the *Meat Trades Journal*.)

ABSTRACT

[Experimental Immunisation of Chickens with Combined Whole Embryo Newcastle and Fowl-pox Vaccines. PRIER, J. E. (1951.) *Vet. Med.* **46.** 103–106.]

Vaccines of Newcastle disease and fowl pox were prepared from ten-day-old chick embryos by inoculating field strains of the viruses in the allantoic sac and on the chorio-allantoic membrane respectively. The whole egg contents were homogenised, and 10 ml. of Newcastle virus suspension + 10 ml. of fowl-pox virus suspension were added to 80 ml. of 50 per cent. buffered glycerol *p*H 7·6 (1·62 grammes anhydrous pot. dihydrogen phosphate in 375 ml. glycerol plus an equal volume of distilled water).

Separate vaccines were also prepared by adding 10 ml. of embryo suspension to 90 ml. glycerol diluent. Two hundred and thirty-five chickens from four to 12 weeks old were used. Compared with the controls, it was found that the combined vaccine immunised birds against both diseases to the extent of 100 per cent. protection against Newcastle disease, and 80 to 90 per cent. protection against fowl-pox virus.

J. G. C.

REVIEW

[Fertility Farming. By NEWMAN TURNER. Faber & Faber, Ltd. Price 16s.]

This book is remarkable only for the aggressive naïveté with which the author pursues his theme of " Fertility Farming," which is nothing more or less than the centuries old method of shallow surface cultivation combined with heavy applications of natural humus or compost—a method which man, with increasing populations to feed and the experience of the centuries behind him, has discarded in favour of greater efficiency. Practically all the accepted methods of farming, and certainly all chemical manures, are labelled " orthodox," and, as such, are roundly declared anathema. It is unfortunate that some of the economic comparisons in method are so full of omissions as to be quite misleading. For instance, in the case of potato cropping no cost allowance is made for ridging in the author's method, although it appears, on reading further, that this procedure actually is carried out. Likewise the assumption that the cow aborting as a result of Brucella infection loses *all* the milk of that lactation is so far from the truth that any calculation made on that basis must be regarded with grave suspicion.

All veterinary practice is also condemned under the same label, and so many of the author's misconceptions on the subject of disease are quoted as being established veterinary opinion that these chapters must make most irritating reading to members of the profession. It would appear that the author has removed the word " disease " from his mind and vocabulary, although possibly not in fact from his farm. Indeed, it would appear fortunate for consumers in this country that local observation and opinion do not bear out the claims made by the author in this book.

Some chapters, notably those on seed mixtures for leys and on weatherproof harvesting of hay and corn by the use of tripods, make interesting reading, but, on the whole, the aggressive presentation of the author's point of view will not commend this book to the majority of readers.

IN PARLIAMENT

Guide Dogs for the Blind

On the motion for the adjournment of the House of Commons on June 27th, Mr. VOSPER (Runcorn) raised the question of the provision of guide dogs for the blind, and the conditions governing the use of those dogs in this country. His own interest in the matter was twofold. He had in his constituency a man who was by trade a chemical worker, and who for many years had devoted the whole of his spare time to the breeding and training of guide dogs. After he had given them initial training they were sent to the Guide Dogs for the Blind Association, and there they were given their final training and were allocated to their owners throughout the country. His second reason was because his attention had been drawn on several occasions in the last 18 months to various Press reports dealing with instances where owners of such guide dogs had been refused admittance to various places public and private, thereby suffering hardship.

The history of guide dogs for blind people was about 40 years old. It originated soon after the turn of this century in Germany and America. So far as he could gather it grew fairly rapidly in these two countries, but it was only 18 years ago that guide dogs were introduced here. He supposed by comparison progress here had been comparatively slow, but the quality of the dogs produced here was far higher than anywhere else in the world. It was a fact that in the 18 years there had been no accident in which a guide dog had been involved. There were now 250 guide dog owners.

There were three advantages which ownership of a guide dog could give to blind people. Firstly, it gave them power to move without a guide, and thereby they gained freedom and independence. Secondly, resulting from that independence, they were helped to get rid of an inferiority complex which they might otherwise possess. They felt, particularly if they were working, that they were on equal status with some of their fellow workers. Thirdly, and possibly most important of all, the ownership of a dog gave them companionship, because the dog in this case was not so much a pet as a partner in everything they did.

The first question he should like to put to the Minister of Health was to ask whether it was the policy of the Government to encourage the development of this movement. They knew that there were some 14,000 blind persons who were in employment or were employable, and a great proportion of them would like to become owners of guide dogs to assist them to and from their work.

It was of interest to remark that a new training centre had recently been opened. That raised his second point: the provision of finance. The establishment of this new training centre was costing in the neighbourhood of £25,000. The mere training of each dog alone cost upwards of £180. That money had, almost without exception, been raised from voluntary sources. It was the wish of the movement that it should remain on a voluntary basis; they felt that the provision of direct finance was neither possible nor desirable. It was, however, possible that help could be given in other directions, and it might be that it was in fact already being given. In this connection he had reason to understand that local authorities were able to make grants towards the purchase price of a dog. The provision of licences for these dogs did not arise, because for many years they had been free from the licence payment, but there were two other aspects in which financial help could be given. In many parts of the country blind persons in employment had been able to claim the expenses in connection with their dogs as expenses against the payment of Income Tax, but there was no set rule for this and it should be of universal application.

The second point was that these dogs, whatever their breed—and several breeds had been tried—were all big dogs, and they naturally had hearty appetites, and at the moment all dog owners found it increasingly difficult to maintain their dogs out of their limited incomes. He did not know what could be done in that direction, but he was informed that in Germany, for instance, an allowance was made to provide for their upkeep.

THE PARLIAMENTARY SECRETARY TO THE MINISTRY OF HEALTH (Mr. BLENKINSOP): This was a matter in which all were anxious to do everything to help, and he was glad to say that it had been possible to do rather more to help during the last few years than it had been for some little while before. All that the hon. Member had said about the general history of this very useful and helpful association—the Guide Dogs for the Blind Association, which was unique in this country—was correct. It was the only body which carried out this work in England, Wales and Scotland.

The hon. Member asked whether it was the Ministry's policy to encourage the development of this work. He would say, and this also answered another question which the hon. Member raised

on whether any contribution to the cost could be made, that they understood that an increasing number of local authorities were making contributions to the cost of training and providing these dogs. Under the National Assistance Act, 1948, local authorities had the power to make such contributions to the Association as they wished, without obtaining prior consent from the Ministry of Health, or from any other Ministry: that was what they would wish them to do.

The Government were very glad to see that the Association, by the opening of a new centre—and they had done their best to help them in the procedure of acquiring some of their premises—would be able to train more dogs and so be able to help those who had been waiting for some little time.

Amongst the difficulties which arose in particular cases were those of ensuring that persons using guide dogs were able to take them both on public transport and to places of work. Obviously, no hard and fast rule could be made; much depended on the actual work places, and in some cases it would be unsuitable and even dangerous for dogs to be taken into them; and many blind people urged that upon them.

In reference to a particular case quoted, he found it hard to understand why a workshop for the blind could not arrange for kennels to be provided. He should, however, mention that the authority concerned did make it clear before training started that this was the rule applied in the workshop; but the training was carried on nevertheless.

He would see that the points raised were discussed with the Advisory Committee on Handicapped Persons, which was steadily considering all these matters in relation both to blind persons and handicapped persons, and see whether any recommendations might be sent out to local authorities after they have given the matter further consideration.

He was glad to say local authorities were increasingly making contributions towards this work and he hoped they would continue to do so. He hoped that the Association would find it possible to extend the work they were carrying out, because all were very well aware of the great value of it, and they wished them very well indeed in their future years of endeavour.

. . . . .

Questions

THERAPEUTIC SUBSTANCES (STANDARDS)

Mr. PHILIPS PRICE (June 25th) asked the Minister of Agriculture what is the present position with regard to the control of the manufacture of veterinary therapeutic substances and the prescribing of standards and tests of purity for such substances.

Mr. T. WILLIAMS: A draft order on this subject was circulated last year to the interests concerned for their comments. A number of amendments were suggested and a revised draft order was subsequently prepared. I expect to receive final comments on the revised draft within the next few weeks, and I hope that it will then be possible to proceed with the making of the Order.

. . .

UNBORN CALVES

Mr. DE LA BERE (June 25th) asked the Minister of Food whether he is aware of the large number of unborn calves found in the beasts sent for slaughter; and what steps he proposes to take to protect the supply of next winter's potential milk.

Mr. WEBB: The hon. Member's assumption is far from being correct. The number of these unborn calves is quite insignificant and it would certainly have no appreciable effect on milk supplies. There is a standing instruction to livestock grading panels not to accept for grading and purchase any cow which in their opinion is in calf, unless they are satisfied that its condition is such that it should be slaughtered.

Mr. DE LA BERE: Is the Minister aware that, unhappily, my assumption is not incorrect? Is he not aware of the figures which support this fact? If this unhappy practice is continued, does he not realise that we shall be heading for milk rationing again and that the Government must accept responsibility for this because of poor prices which they are paying to the milk producers to-day?

Mr. WEBB: We must separate the two things. I do not think that the situation, however serious it was, would have an appreciable effect on the supplies of milk this autumn, but in so far as it is a problem I should be glad to look at it.

Mr. DE LA BERE: Is not the right hon. Gentleman aware that the figures support me? I am right.

NOTES AND NEWS

Diary of Events

July 11th.—Annual General Meeting of Association of Veterinary Teachers and Research Workers (Northern Region) at "Leahurst," Neston, Wirral, 2.30 p.m.

July 13th.—Society of Practising Veterinary Surgeons, Meeting of Council, Royal (Dick) Veterinary College.

July 17th.—Summer Meeting of Mid-West Division, N.V.M.A., at the Zoo, Clifton, Bristol, 2.15 p.m.

July 19th.—Meeting of Association of Veterinary Teachers and Research Workers (Southern Region) at Bristol University, School of Veterinary Science, 9.45 a.m.

July 20th.—Summer Meeting of Royal Counties Division, N.V.M.A. (See Notice.)

July 20th.—Summer Meeting of Eastern Counties Division, N.V.M.A., at Newmarket. (See Notice.)

July 21st.—Meeting of the Biochemical Society, in the Department of Biochemistry, University of Sheffield, 10.30 a.m.

July 25th.—Summer Meeting of the Lancashire Division, N.V.M.A., at the A.I. Centre, Tilston, Tarporley, at 2.30 p.m., after an informal lunch in Chester at 12.45 p.m.

July 25th.—Meeting of the Editorial Executive, N.V.M.A., 2.30 p.m. (*Members please note alteration from second to fourth Wednesday, for this month only.*)

Sept. 23rd-29th.—Sixty-ninth Annual General Meeting and Congress of the National Veterinary Medical Association, at Eastbourne.

N.V.M.A. MEETINGS IN EDINBURGH

Wednesday, July 11th:
11 a.m. Home Appointments Committee.
2 p.m Organising Committee.
4 p.m. Parliamentary and Public Relations Committee

Thursday, July 12th:
11 a.m. Veterinary State Medicine Committee.
2 p.m. General Purposes and Finance Committee.

Friday, July 13th:
11 a.m. Council.

* * * * *

Veterinary Surgeons Act, 1948

Committee on Licensing of Employees of Animal Welfare Societies

The Minister of Agriculture and Fisheries has appointed a Committee to examine and advise him upon the problems raised by applications for licences under Section 7 of the Veterinary Surgeons Act, 1948, with particular reference to intentions that have been expressed for the immediate future. The Committee is constituted as follows:—

A. J. Champion, Esq., M.P., Joint Parliamentary Secretary to the Ministry (Chairman).
Sir Robert R. Hyde, K.B.E., M.V.O.
Dr. G. Roche Lynch, M.B., O.B.E.
Professor P. B. Medawar, M.A., D.SC., F.R.S.
Claud Mullins, Esq.

Section 5 of the Veterinary Surgeons Act, 1948, prohibits veterinary practice by persons who are not qualified veterinary surgeons or registered in the Supplementary Veterinary Register established under the Act.

Section 7 gives the Minister discretionary power to grant licences to employees of animal welfare societies which cannot obtain the services of an adequate number of veterinary surgeons. These licences enable the holders to give medical or other treatment to animals and, for the relief of pain, to perform minor operations.

Mr. G. H. Higgs, O.B.E., and Mr. A. F. Mitchell, of the Ministry of Agriculture and Fisheries, have been appointed Secretary and Assistant Secretary of the Committee. Communications should be addressed to the former at Hook Rise, Tolworth, Surbiton, Surrey.

PERSONAL

London University Titles

The University of London announces the conferment of the following titles:—

Professor of Veterinary Pathology.—Mr. T. J. Bosworth, M.A. (CANTAB.), M.R.C.V.S., D.V.S.M.

Professor of Veterinary Physiology.—Dr. E. C. Amoroso, M.B., B.CH., B.A.O. (N.U.I.), PH.D.

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Births.—Simpson.—On June 14th, 1951, to Doreen (née Pouquand), wife of Charles A. C. Simpson, M.R.C.V.S., a son—Charles Jeremy.

Watson.—On June 17th, 1951, to Eileen (*née* Ball), wife of Arthur H. Watson, M.R.C.V.S., of Colston House, Burley-in-Wharfedale, Yorks, a son—Nicholas Arthur.

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Marriages.—Davies—Davies.—On June 23rd, 1951, at St. John's Church, Maesteilo, Llandilo, Edmund Thomas Davies, B.V.SC., M.R.C.V.S., son of the late Mr. T. Davies and of Mrs. Davies, Brynyrafon, Black Mill, Bridgend, to Morfudd, daughter of Mr. and Mrs. T. Davies, Ffrwdwen, Capel Isaac, Llandilo.

Mercer—Baker.—On June 2nd, 1951, at St. Giles Church, Willenhall, Staffs, Peter H. Mercer, M.R.C.V.S., only son of Mr. and Mrs. H. A. Mercer, of Burton Hastings, Warwickshire, to Diana, younger daughter of Mr. and Mrs. G. F. Baker, of Tettenhall, Staffs.

Sachs—Samuel.—On July 10th, 1951, at Cardiff, Mr. M. Sachs, M.R.C.V.S., son of Mr. and Mrs. E. Sachs, of 6, Buckingham Mansions, London, N.W.6, to Miss S. Samuel, daughter of Mr. and Mrs. S. Samuel, of 200, Albany Road, Cardiff.

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Mr. Steele-Bodger.—We learn with much regret that Mr. Harry Steele-Bodger, M.R.C.V.S., of Tamworth, recently was taken ill on a journey north and subsequently had to undergo an operation in a Birmingham hospital. It will be the earnest hope of all our readers that Mr. Steele-Bodger will thereby be restored to a full measure of health and strength.

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Mr. John Wooldridge.—The many friends of Dr. W. R. and Mrs. Wooldridge will be relieved to learn that their son John, who goes up to Cambridge in the autumn, is making steady progress following an operation at Guy's Hospital on Saturday last, when Mr. R. C. Brock, the eminent cardiac surgeon, performed a valvulotomy.

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Doctorate for Mr. Joseph Edwards.—More particularly because of his very cordial contacts with our profession, we are pleased to record that Mr. Joseph Edwards, scientific adviser to the Milk Marketing Board (England and Wales) and head of the production division, has been granted the degree of Doctor of Science (D.Sc.) by the University of Glasgow.

The degree recognises his work in original research in animal breeding, the physiology of milk secretion and artificial insemination carried out at the University of Cambridge and developed by the Milk Marketing Board over the past 15 years.

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The "Royal" at Cambridge: Conferment of Honorary Degrees.—At a congregation in the Senate House on July 2nd, honorary degrees of Doctor of Law were conferred in recognition by the University of Cambridge of the opening of the Royal Show, on the Princess Royal; Mr. Tom Williams, Minister of Agriculture; Sir James Scott Watson, Chief Scientific Adviser to the Minister of Agriculture; Colonel H. J. Cator, President of the Royal Agricultural Society, and Mr. A. J. Hosier, farmer inventor of the milking bail to be used in the open air.

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R.C.V.S. OBITUARY

Robb, William, J.P., F.R.C.V.S., Emeritus Professor of Surgery in the University of Glasgow. Graduated Glasgow, December 18th, 1888; Fellowship May 14th, 1897. Died June 27th, 1951, at 15, Beech Avenue, Glasgow; aged 82 years.

Watkins-Pitchford, Herbert, C.M.G., F.R.C.V.S., F.R.S.E., Lieut.-Colonel R.A.V.C. (retd.) Graduated London, May 16th, 1889; Fellowship December 14th, 1894. Died June 25th, 1951; aged 85 years.

Emeritus Professor William Robb, J.P., M.R.C.V.S.

Sorrow will be widespread in the profession, and particularly amongst his former Glasgow students, at the death of Emeritus Professor William Robb, who was for more than 20 years Professor of Veterinary Medicine, Surgery and Obstetrics at the Glasgow Veterinary College.

A graduate of the college in 1888, Professor Robb went into practice with his father in Townhead, Glasgow, where the family business has been established for many years. He became a J.P. of the city and chairman of the local Unionist association. For some years he was examiner in anatomy for the Royal College of Veterinary Surgeons and his other appointments included that of examiner in veterinary hygiene for Glasgow University. He was a member of the N.V.M.A. Special Committee on the Euthanasia of Small Animals, the report of which was published in 1937.

Professor Robb retired from the staff of the Glasgow Veterinary College a few years ago, and in due course the distinction of Professor Emeritus was conferred upon him. A memoir will appear in our columns at an early date.

Lieut.-Colonel H. Watkins-Pitchford, C.M.G., F.R.C.V.S., F.R.S.E.

We record above with the deepest regret the death, which took place at Illovo Beach, Natal, of Lieut.-Colonel Herbert Watkins-Pitchford, who devoted his professional life largely to the control of animal diseases in South Africa, where he went some years before the outbreak of the South African War, at which time he was principal veterinary surgeon in the employment of the Government in Natal and went through the siege of Ladysmith. He became Director of the Veterinary Department of the Colony in 1902, and in the course of the next year veterinary and remount officer. During the 1914-18 War he served with the Royal Army Veterinary Corps, and in 1918 was appointed Commandant of the Army Veterinary School at Aldershot, returning to South Africa on completion of his four years' term in that post.

Fuller reference to Colonel Watkins-Pitchford's life and work will be made in a later issue.

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RESTORATION TO R.C.V.S. REGISTER

We are informed by Mr. W. G. R. Oates, as Registrar under the Veterinary Surgeons Acts 1881 to 1948, that the name of Mr. Finlay George Fraser, Sunnyside, Eden Hall, Penrith, Cumberland, was restored to the Register of Veterinary Surgeons on June 6th, 1951.

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Protection of Wild Animals

Prohibition of Field Sports Not Recommended

The report of the Committee on Cruelty to Wild Animals, appointed by the Home Secretary and the Secretary of State for Scotland two years ago after a debate in Parliament on field sports, was published on June 26th (Cmd. 8,266, H.M.S.O., 3s. 6d.). The Chairman of the Committee was Mr. J. Scott Henderson, K.C., and the seven other members included Major (now Professor) L. P. Pugh, B.SC., F.R.C.V.S., whilst the National Veterinary Medical Association was amongst the organisations which submitted memoranda to the Committee. Professor A. N. Worden, M.R.C.V.S., was one of the witnesses for the Universities Federation for Animal Welfare.

Pending the publication of an extended notice in a later issue, it must now be recorded that the Committee finds that none of the existing and well-established field sports should be prohibited solely on grounds of cruelty, except possibly otter hunting, and that only after enquiry and in certain districts.

The Committee states that interference with a sport would be justified only if the suffering caused was greater than that of other methods of controlling wild animals. With few exceptions most allegations of cruelty were not proved. The gin trap, which is believed to be widely used by trappers, is condemned by the Committee as a "diabolical instrument" which causes an incalculable amount of suffering.

A main recommendation is that all wild animals should be brought within the provisions of the Protection of Animals Act, thus making it possible to take action against any person causing or permitting unnecessary suffering to a wild animal. As such provision might unduly discourage field sports to an extent neither necessary nor desirable, there should be special provision that:—

(*a*) Nothing in the Act should apply to the commission or omission of any act in the course of the hunting, pursuit, capture, destruction, or attempted destruction of any wild animal unless such hunting, etc., was accompanied by the infliction of unnecessary suffering; and

(*b*) Subject to other provisions of the Act, the hunting, coursing, pursuit, capture, destruction, or attempted destruction of any deer, fox, hare, or otter for the purpose of sport should be lawful while conducted under the approved rules of sport.

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ADDRESSES OF DISEASE-INFECTED PREMISES

The list given below indicates, first, the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

FOOT-AND-MOUTH DISEASE:

Clackmannan.—The Haugh of Black Grange, Alloa, Clackmannanshire (July 2nd).

Perths.—Hill of Drip, Stirling (July 2nd).

SWINE FEVER:

Isle of Ely.—Harold Bridge, Gorefield, Wisbech (June 21st); Purls Bridge, Manea, March (June 27th).

Cheshire.—Boundary Farm, Newton, Prestbury, Macclesfield (June 26th).

Derby.—Old Hall, Buxworth, Stockport (June 25th).

Lanark.—Craigendmuir Piggeries, Stepps, Glasgow (June 21st).

Lancs.—Bowker Farm, Haughton Green, Denton, Manchester; Debdale Farm, Longhouse Lane, Poulton-le-Fylde, Blackpool (June 21st).

Lincs (*Kesteven*).—Grange Farm, Beckingham, Lincoln (June 21st).

Lindsey.—117, Grammar School Road, Brigg (June 26th).

Midlothian.—Broomdale, 5, Gyle Road, and Windyvale, Gylemuir Road, Corstorphine (June 28th).

Norfolk.—21, Cottishall Road, Buxton (June 29th).

Staffs.—The Poplars, Iretsey Bank, Wheaton, Aston (June 28th).

Notts.—Hemlock Stone Piggeries, Stapleford, Nottingham; 71, Whitemoor Gardens, Whitemoor, Nottingham (June 26th).

Yorks (*E.R.*).—West End House, South Cave, Brough (June 28th).

Yorks (*W.R.*).—Grange Farm, Soothill, Batley (June 21st); Doublestones, Silsden (June 29th).

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LIVESTOCK REARING ACT, 1951

In a recent announcement relating to the above, the Ministry of Agriculture state that the object of the Act is to give further encouragement to the breeding and rearing of cattle and sheep in upland areas. It extends the Hill Farming Act of 1946 in several ways. Grants equal to half the cost of the work done now become available for the improvement of other livestock rearing land in upland areas as well as hill farming land. The funds available for grant have been increased from £4,000,000 to £20,000,000, with an additional £2,000,000 if necessary. Proposals for schemes must be sent in by November 5th, 1956. A leaflet giving full details of the grants and an application form can be obtained from the Ministry in London or Aberystwyth or from County Agricultural Executive Committees, in upland districts.

The Act also extends for five years the Minister's powers to pay hill cattle and hill sheep subsidies.

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CATTLE BREEDING IN BRITISH NORTH BORNEO

The Colonial Development Corporation announces that it has initiated an exploratory pilot scheme for the breeding of beef cattle in the Keningau plain of British North Borneo, where it has leased 1,000 acres of Crown land. A further 14,000 acres may be leased if the experiments are successful. The British capital involved is £15,000.

Some 300 cattle, offspring of a herd started 20 years ago by the now defunct North Borneo Chartered Company, are running wild in the Keningau plain. They will be corralled and breeding beasts will be selected from them. Local demand for beef exceeds present supplies and the prospective output from the corporation's ranch.

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DURHAM SHOW'S "A.I." CLASSES

This year's show of the Durham and County Agricultural Society, to be held at Darlington on August 3rd and 4th, will have six classes for young dairy stock produced by artificial insemination.

"More than 3,000 farmers, from South Northumberland down into North Yorkshire, now use Shincliffe, the Milk Marketing Board's local A.I. cattle breeding centre which this year will 'sire' 15 per cent. of all calves born in the area," states the *Newcastle Journal*, which adds: "Though there are still many Northern farmers hostile to this method of cattle-breeding, the steadily advancing membership at Shincliffe seems to indicate that the opposition is being overcome."

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the N.V.M.A.

ELECTROCUTION OF CATS AND DOGS

Sir,—I am grateful to Dr. Voûte for clearing up certain points in connection with this subject. May I ask him to make clear that, unless I am mistaken, his figures (100 mA to 150 mA) relate to his own method, in which the current passes through the head of the animal. It is extremely important to be clear about this, because in the apparatus used in England the current passes from the neck to the hind quarters without ever going near the head. What I am afraid of is that some readers may make the mistake of supposing that his figures would apply to the English practice, whereas in fact a current of 100 mA passing through the body alone, as distinct from the head, would undoubtedly cause extreme torture, though it might result in death after the lapse of a certain time.—Yours faithfully, C. W. HUME, The Universities Federation for Animal Welfare, 284, Regent's Park Road, Finchley, London, N.3. *June 26th*, 1951.

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HISTORY OF THE ROYAL (DICK) VETERINARY COLLEGE

Sir,—I read your account of Mr. Thomas A. Joynt's history of the Dick College, contributed to the June 1st issue of "The Scotsman," and then re-read it, not once but several times, unable to credit the evidence of my eyes. An article purporting to be a history of the "Dick" without mention of the name of Bradley was surely impossible. Here was a man loved and respected by generations of students, who spent his life in the service of the college to the good of the profession which he adorned, yet no allusion is made to his successful and fruitful principalship. Many regard the Bradley era as the Golden Age of the Dick; in fact, to all of us and to others in far wider spheres he was the "Dick" and the "Dick" was Bradley. "The Scotsman" has a wide circulation both at home and abroad, and this unforgivable omission must have been a source of pain and wonderment to his relatives and friends, and of anger and resentment to the alumni.

Surely if it were felt desirable that an article on the history of the college should be contributed to the press at this historic time when the college ceases to function as a separate entity it should have been authoritative and could have been more fittingly and appropriately entrusted to one of our alumni with special qualifications for the task, whose personal knowledge and experience would have prevented this amazing omission.—Yours faithfully, J. E. WILSON, Oakmount Cottage, Lasswade, Midlothian. *June 22nd*, 1951.

DISEASES OF ANIMALS ACT, 1950—GREAT BRITAIN

Summary of Returns of Confirmed Outbreaks of Scheduled (Notifiable) Diseases

Period	Anthrax	Foot-and-mouth	Fowl Pest	Parasitic Mange*	Sheep Scab	Swine Fever
June 1st to 15th 1951	14	—	6	—	—	55
Corresponding period in—						
1950	14	1	8	—	—	5
1949	12	—	35	—	1	—
1948	3	—	9	—	—	1
Jan. 1st to June 15th, 1951	250	18	476	—	4	428
Corresponding period in—						
1950	199	14	81	—	19	8
1949	96	11	249	—	28	5
1948	47	—	190	1	26	17

* Excluding outbreaks in Army Horses.

N.V.M.A. CONGRESS, 1951

Revised Programme

Congress Meetings will be held in the Floral Hall, Winter Garden, Eastbourne

Sunday, September 23rd

EVENING: 8.0. Reception by Sussex and South-Eastern Counties Divisions.

Monday, September 24th

MORNING: 10.0. Civic Opening of Congress by His Worship the Mayor of Eastbourne.
10.30. Opening of Exhibition of Surgical Instruments, Drugs, etc., by the President, N.V.M.A.
11.30. Sectional Meetings.

AFTERNOON: 2.30. *Address*: "Control of Diseases of Livestock: a comparison of methods in different countries and their significance," by Sir Thomas Dalling, M.A., M.R.C.V.S., F.R.S.E., Chief Veterinary Officer, Ministry of Agriculture, followed by an address on the same subject by Dr. L. P. de Vries, Secretary, Animal Health Service, The Hague, Holland; and also by an American contributor.

EVENING: 8.30. Civic Reception, Dance and Cabaret, given by the Mayor and Mayoress of Eastbourne, at the Winter Garden, Devonshire Park, Eastbourne.

Tuesday, September 25th

MORNING: 9.30. *Paper*: "Johne's Disease, its Diagnosis and Control," by Dr. A. W. Taylor, M.R.C.V.S., of Compton. Opener: Mr. H. T. Matthews, B.V.SC., F.R.C.V.S., D.V.H.

AFTERNOON: 2.30. Small Animal Surgery, including X-rays, in the Gas Theatre, Eastbourne, arranged by Mr. Gordon C. Knight, F.R.C.V.S. Ladies' Excursion.

EVENING: 8.30. Reception and Dance given by the President, N.V.M.A. at the Grand Hotel, Eastbourne.

Wednesday, September 26th

MORNING: 9.30. *Paper*: "The Application of Genetics to the Breeding of Farm Livestock," by Professor M. M. Cooper, Wye. Opener: Professor Wm. C. Miller, M.R.C.V.S., F.R.S.E.
12.0. Last meeting of Council 1950/51.

AFTERNOON: 2.30. Congress Photograph.
3.0. Annual General Meeting.

EVENING: 7.30 for 8.0. Annual Banquet, at the Grand Hotel.

Thursday, September 27th

MORNING: 9.30. *Paper*: "The Natural History of Canine Viral Hepatitis," by Mr. H. B. Parry, B.A., M.R.C.V.S., and Dr. N. M. Larin. Opener: Professor L. P. Pugh, B.Sc., F.R.C.V.S.

AFTERNOON: Free for Golf, Tennis, etc.

EVENING: 8.30. Ladies' Guild Dance, at the Grand Hotel, Eastbourne.

Friday, September 28th

MORNING: 9.30. *Paper*: "Parasitic Bronchitis in Cattle," by Dr. E. L. Taylor, M.R.C.V.S., D.V.H., of Weybridge. Opener: Mr. J. W. Bruford, M.R.C.V.S.

AFTERNOON: 2.30. Large-animal Surgery Demonstrations at the Wellcome Veterinary Research Station, Frant, Nr. Tunbridge Wells.

1. Films—shown by Mr. J. McLintock, M.R.C.V.S.
2. Rumenotomy—by Mr. K. Stuart, M.R.C.V.S.
3. Dishorning—various methods to be demonstrated.
4. Demonstration of Certain Methods for the Evaluation of Bull Semen—by Mr. J. L. Hancock, M.V.SC., M.R.C.V.S.

Ladies also invited to visit Frant, where special arrangements will be made for their entertainment.

EVENING: Dance given by the Grand Hotel.

Saturday, September 29th

MORNING: 10.0. Closing Meeting of the Congress, followed by
First Meeting of 1951/52 Council, N.V.M.A.

N.V.M.A. CONGRESS, 1951

September 23rd - 29th (inclusive)

List of Hotels in Eastbourne

The following is a list of recommended hotels in Eastbourne, giving particulars of their charges, etc. Members are advised to make reservations *as soon as possible* direct to the hotel of choice. Should a fuller list or any other information about Eastbourne be required, this can be obtained on application to the Publicity Department, Information Bureau, Eastbourne (Tel.: 4848).

The headquarters hotel for the period of the Congress and at which most of the evening functions will be held, is the Grand Hotel, Grand Parade, and block reservations of double and single rooms have been made there by the Association. These reservations will be held until the end of July *only*.*

Recommended Hotels in Eastbourne in the vicinity of the Conference Hall (the Winter Gardens) and the Headquarters Hotel

Name and Address	*Inclusive*	† *Bed and breakfast*
Licensed		
Grand Hotel, Grand Parade	36/- to 55/- per day	29/- to 47/6
Cavendish, Grand P'de	35/- to 60/- per day	30/- to 35/-
Imperial, Devonshire Place	7 to 11 gns.	—
Hydro, Mount Road ...	8 to 12 gns.	—
Kenilworth Court, Wilmington Square ...	From 7 gns.	17/6
Sea View, Grand Parade	8 to 10 gns.	—
Beaulieu, Grand Parade	8½ to 10 gns.	—
Sandhurst, Grand P'de	From 25/- per day	—
Southdown, Howard Square	7 to 11 gns.	—
Neptune Court, Jevington Gardens ...	5 to 8½ gns.	15/6
Clarendon, Gildredge Road	7 to 8½ gns.	—
Sussex, Cornfield Terrace	9 gns.	17/6
Clifton, South Street ...	7 to 10 gns.	—
Hotels and Private Hotels		
Lansdowne, Grand Parade	7½ to 11 gns.	19/6
Haddon Hall, Devonshire Place	7 to 10 gns.	—
West Rocks, Grand Parade	6 to 10 gns.	—
Wish Tower, Grand Parade	7 to 10½ gns.	21/-
Queensborough, Grand Parade	7 to 10 gns.	15/6
Oban, Grand Parade ...	7 to 10 gns.	—
New Wilmington, Compton Street ...	7 to 9 gns.	18/6
Quendon, Carlisle Road	6 to 7½ gns.	—
Lynwood, Jevington Gardens	4½ to 7½ gns.	—
Lamont, Wilmington Square	7½ to 9 gns.	—
Caithness, Wilmington Square	7 to 9 gns.	—
South Cliff, South Cliff	6 to 8½ gns.	13/6
Shirley Court, Hardwick Road	6 to 8 gns.	—
Lathom House, Howard Square	6 to 8½ gns.	15/6
Stanley House, Howard Square	7 to 10 gns.	15/6
Whitehall, Howard Square	6 to 9 gns.	—
Ben Reay, Carlisle Road	6 to 8 gns.	—
Marden, Carlisle Road	6 to 7½ gns.	—
Medwyn Court, Carlisle Road	5½ to 6½ gns.	—
Southborough, Carlisle Road	5½ to 7 gns.	—
Alwyn, Jevington G'dns	6 to 7 gns.	—
Brooklyn, Jevington Gardens	7 to 8 gns.	—
Candar, Jevington G'dns	5 to 6½ gns.	—
The Chimes, Jevington Gardens	5½ to 6½ gns.	—
Elmscroft, Jevington Gardens	5 to 5½ gns.	—
Fairlands, Jevington Gardens	5 to 6½ gns.	—
Hazelhome, Jevington Gardens	From 5½ gns.	—
Jevington Guest House, Jevington Gardens ...	5 to 6 gns.	—
Kuvee, Jevington Gdns.	From 4½ gns.	—
Little Seeleys, Jevington Gardens ...	5 to 7 gns.	—
Morningside, Jevington Gardens	From 5½ gns.	—
Rosforde, Jevington Gardens	5 to 5½ gns.	—
Springhaven, Jevington Gardens	5 to 6½ gns.	—
Sussex Guest House, Jevington Gardens ...	4½ to 6 gns.	—
Tor View, Jevington Gardens	5½ to 6½ gns.	—
East Mullion, Lascelles Terrace	7 to 9 gns.	—
Mowbray, Lascelles Terrace	5 to 7 gns.	—
Revelstoke, Lascelles Terrace	6½ to 7½ gns.	—
South Lynn, Lascelles Terrace	5½ to 6½ gns.	—
Edenhurst, Wilmington Gardens	5½ to 7 gns.	12/6
Farrars, Wilmington Gardens	5 to 6½ gns.	—
Kingscourt, Wilmington Gardens ...	5 to 7 gns.	12/6
Park View, Wilmington Gardens	5 to 6½ gns.	—
Travancore, Wilmington Gardens ...	5 to 6½ gns.	—
Devonshire Court, Wilmington Square ...	5 to 7 gns.	—
Ellesmere, Wilmington Square	5 to 7 gns.	—
Faircroft, Wilmington Square	6 to 8 gns.	—
Southview, Wilmington Square	6 gns.	—
Country Accommodation		
Birling Gap Hotel, Birling Gap, East Dean	8 gns.	
Woodside, Hailsham	From 6 gns.	
Glyndley Manor, Hankham, Hailsham ...	From 8 gns.	
Chalk Farm, Willingdon, Hampden Park	From 6 gns.	
Martlets, Pevensey Park Road, Pevensey	5 to 5½ gns.	

* In booking at the Grand Hotel, if attendance at the N.V.M.A. Congress is mentioned, special terms will be allowed.

† The hotels indicated offer bed-and-breakfast accommodation at the terms quoted, but only for odd nights and not for full week bookings.